

**VIRGINIA STANDARDS OF LEARNING**

**Spring 2004 Released Test**

**END OF COURSE  
ALGEBRA I**

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**LARGE PRINT FORM**

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## DIRECTIONS

Read and solve each question. For this test you may assume that the value of a denominator is not zero.

## SAMPLE

Which is equivalent to  $\frac{b^6}{b^2}$ ?

A  $\frac{1}{b^3}$

B  $b^3$

C  $b^4$

D  $b^8$

- 1 Consider the procedure used below to solve the given equation.

Given:  $3(x - 2) = 17$

(1st step)  $3x - 6 = 17$

(2nd step)  $3x = 23$

(3rd step)  $x = \frac{23}{3}$

Which of the following properties is a justification for the 1st step?

- A Associative property of addition
- B Commutative property of addition
- C Distributive property
- D Transitive property of equality

2 Which statement CANNOT be justified by one of the properties of real numbers?

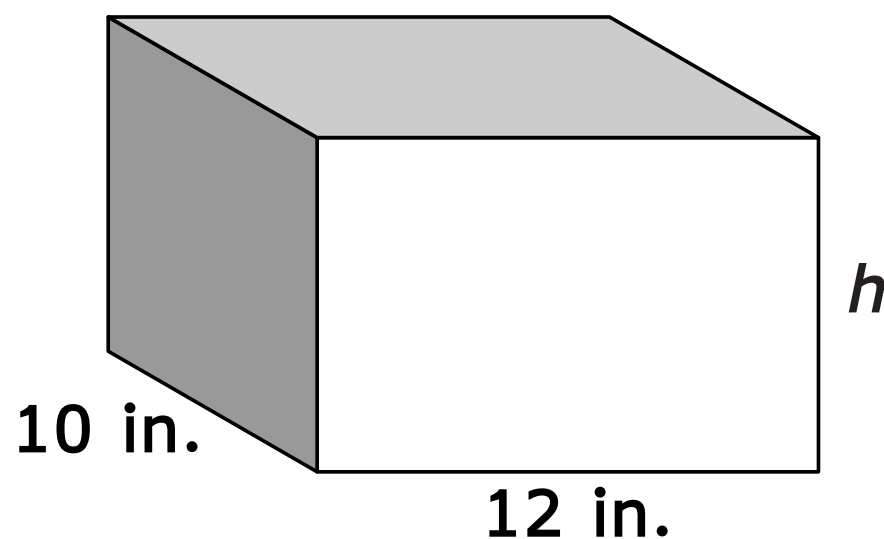
F  $(a + b) + c = a + (b + c)$

G  $a - (b \div c) = (a - b) \div c$

H  $(ab)c = a(bc)$

J  $(a + b) + 0 = 0 + (a + b)$

- 3 The volume of a rectangular solid is 960 cubic inches.  
The dimensions of the base are 12 inches by 10 inches.



What is the height of the solid?

- A 4 in.
- B 8 in.
- C 120 in.
- D 840 in.

4 What is the solution to

$$5 - \frac{n}{2} = 12?$$

F -34

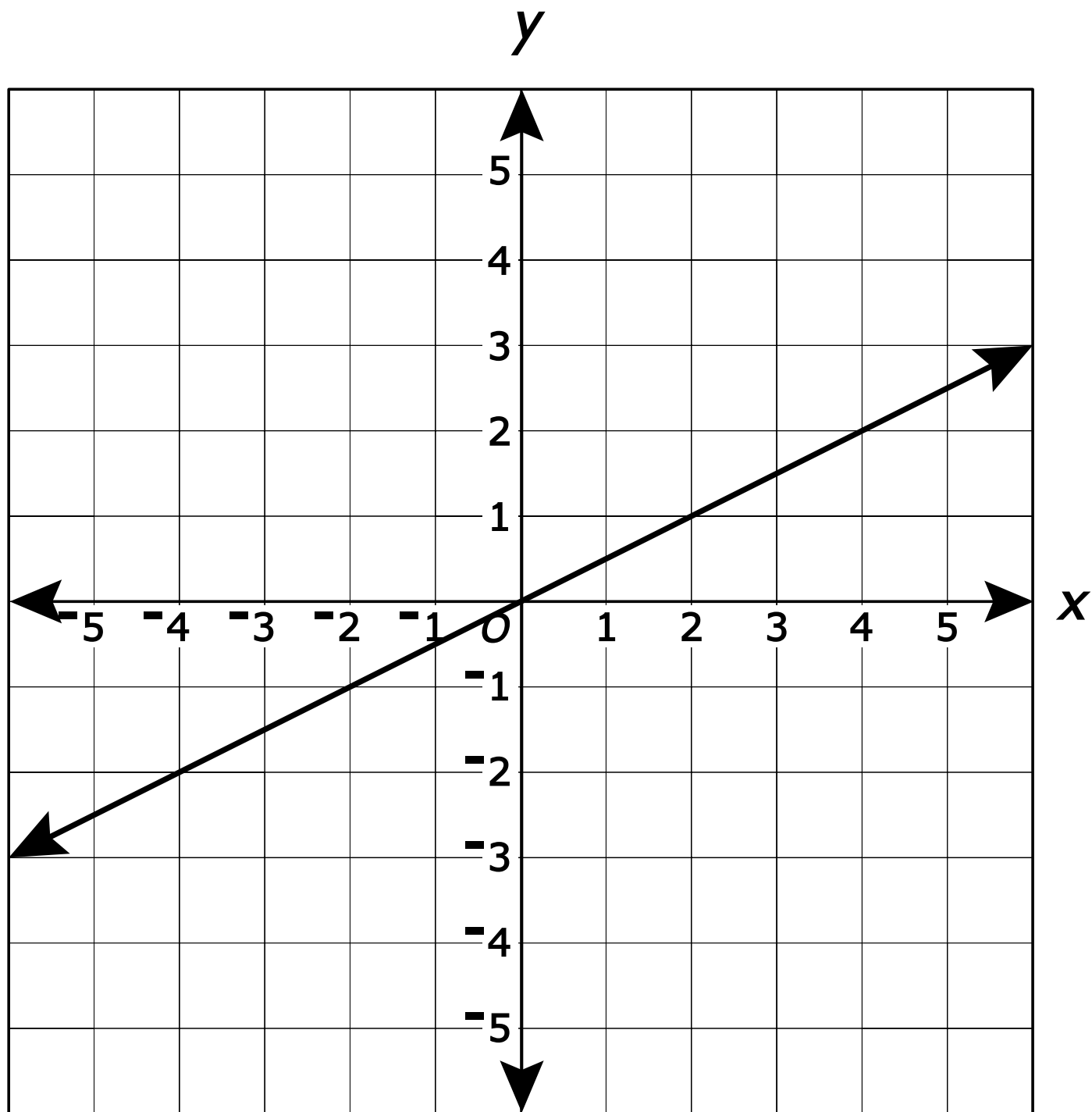
G -14

H 14

J 34

**Turn the page  
and  
continue working.**

5 This graph represents  $y = \frac{1}{2}x$ .





If the line in the graph is shifted down 3 units, which is the equation for the new line?

A  $y = -\frac{1}{2}x$

B  $y = \frac{3}{2}x$

C  $y = \frac{1}{2}x - 3$

D  $y = \frac{1}{2}x + 3$

6 The left side of a solid block is held at a constant temperature of  $200^{\circ}\text{C}$ . The temperature profile within the block is given by  $T = 200 - 5x - x^2$  where  $x$  is the distance from the left side of the block in centimeters and  $T$  is the temperature in degrees Celsius of the block at location  $x$ . At what value of  $x$  is  $T = 50^{\circ}\text{C}$ ?

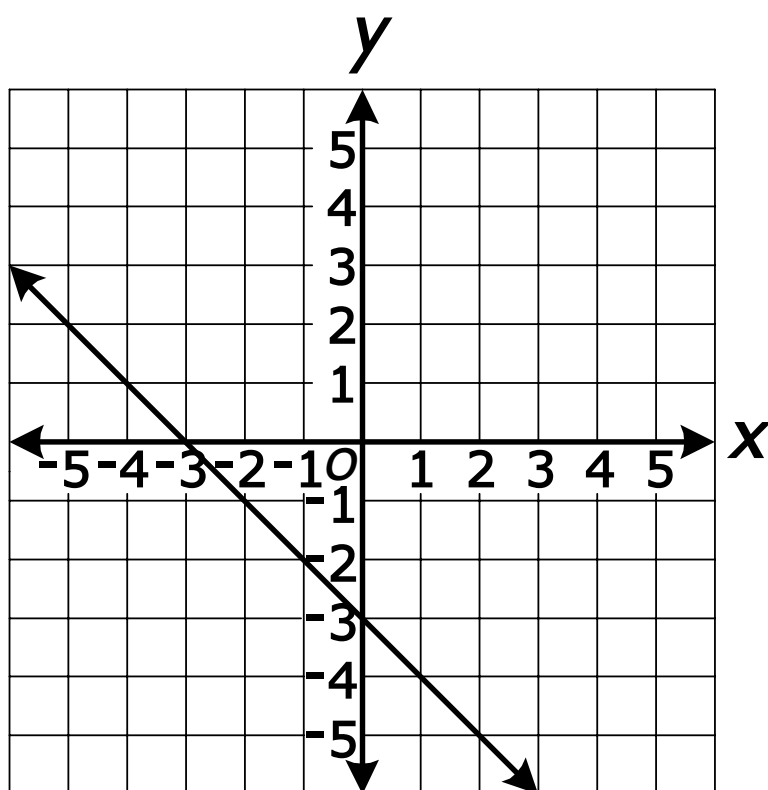
F  $x = 5$  cm

G  $x = 10$  cm

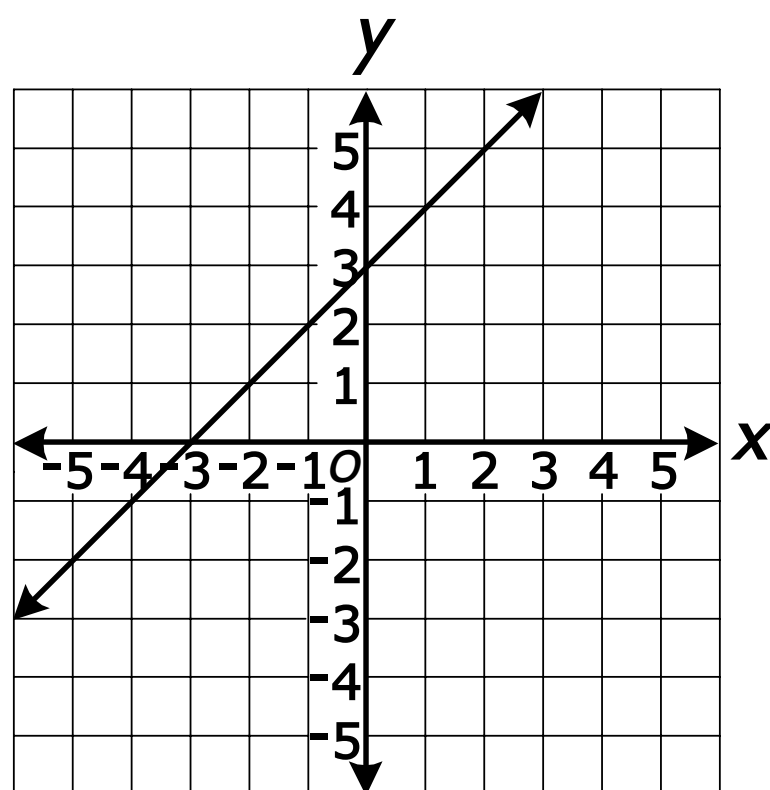
H  $x = 15$  cm

J  $x = 20$  cm

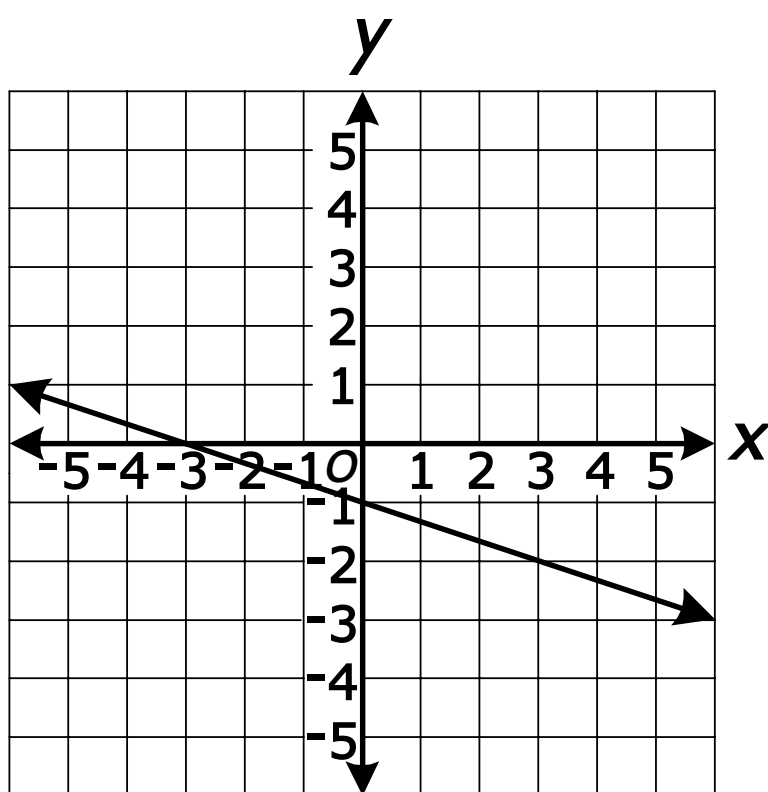
7 Which graph best represents the equation of the line with slope of 1 and  $y$ -intercept of  $-3$ ?



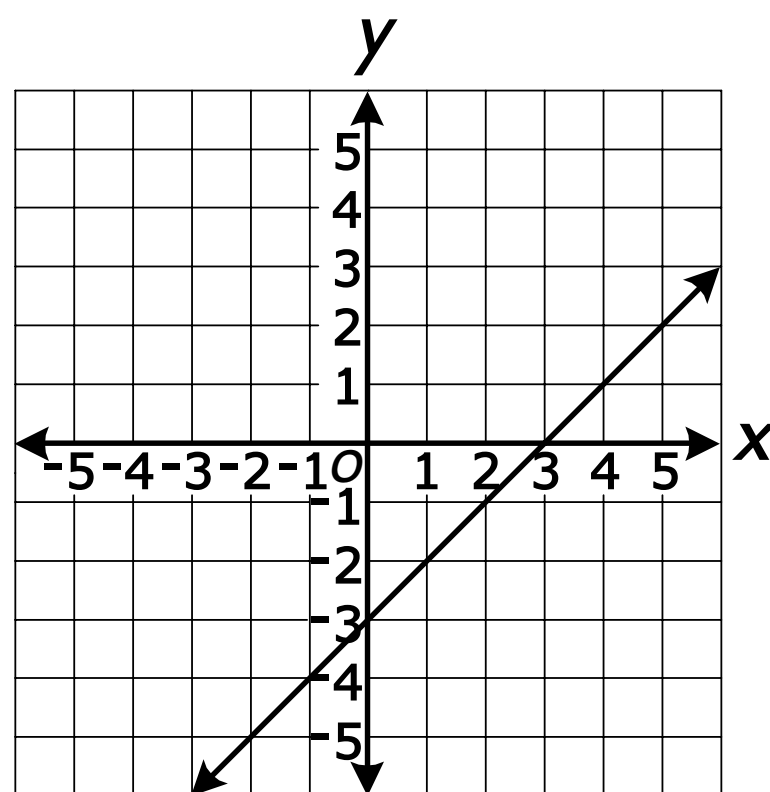
A



C



B



D

8 Which equation is the slope-intercept form of

$$-x + 6y = 12?$$

F  $y = \frac{1}{6}x + 2$

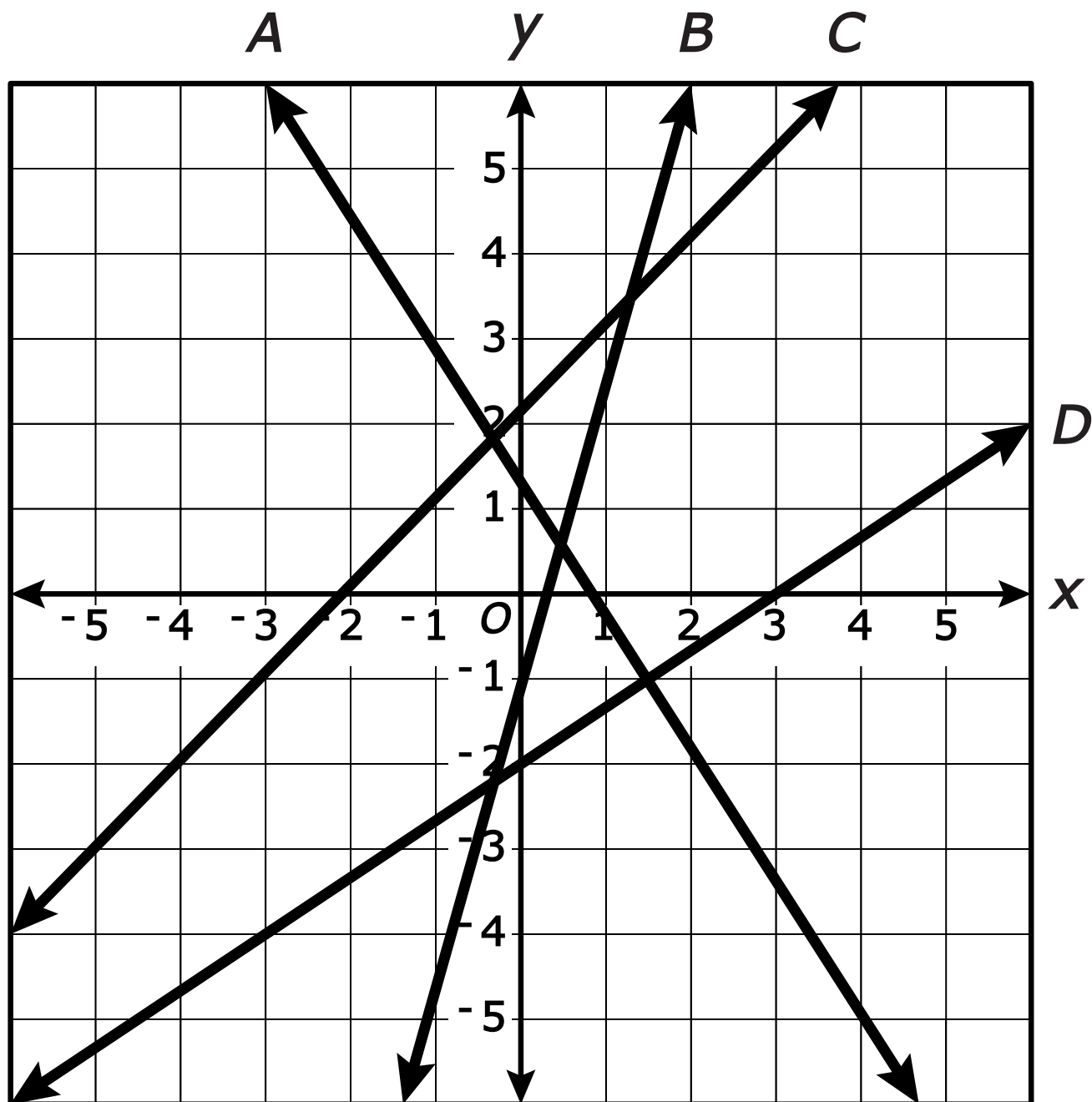
G  $y = -\frac{1}{6}x + 2$

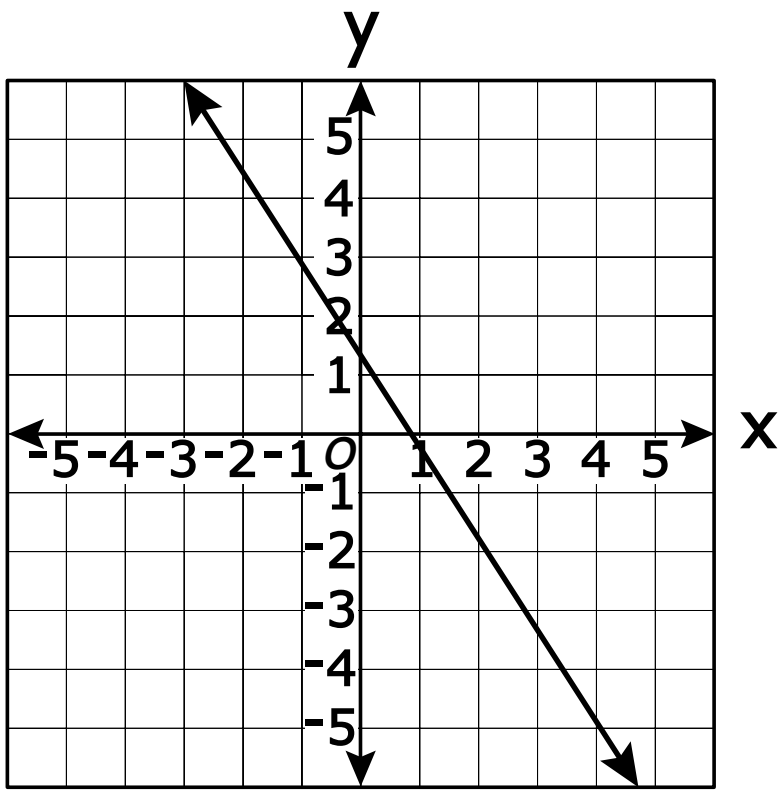
H  $x = 6y - 12$

J  $6y = 12 + x$

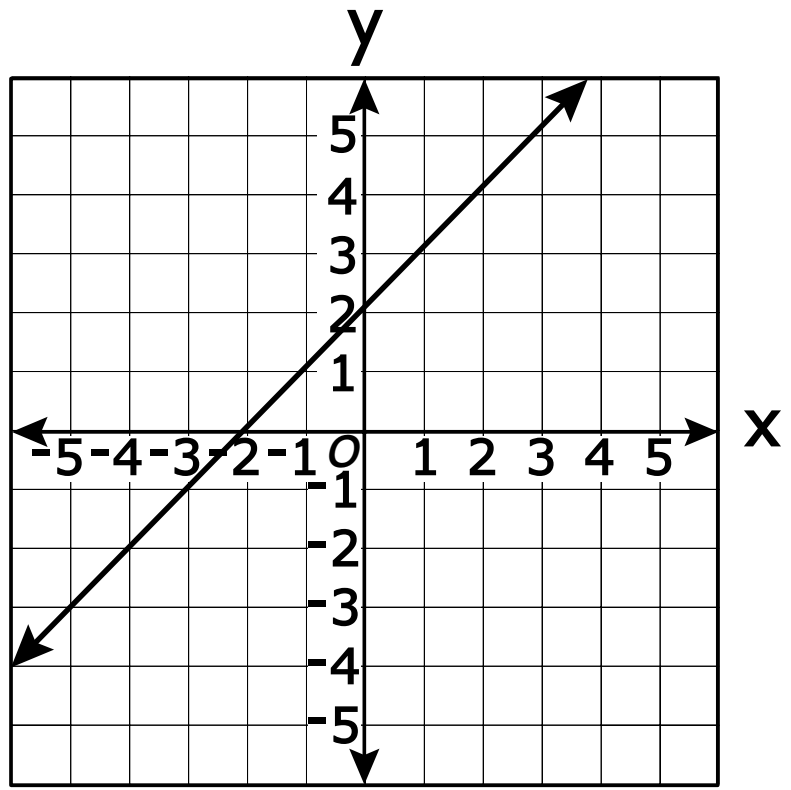
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and  
continue working.**

9 Which line on the graph below has a negative slope?

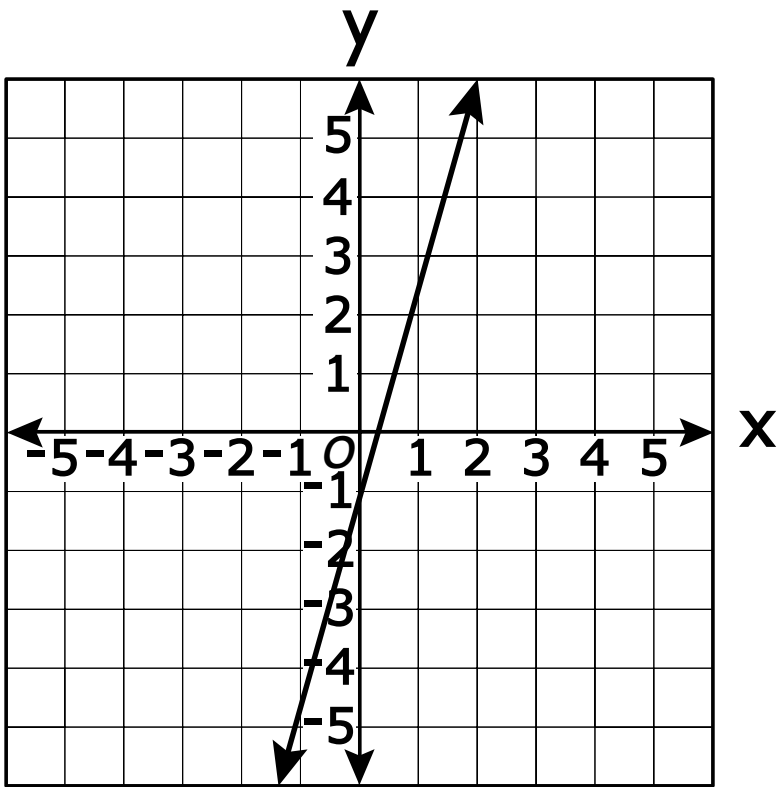




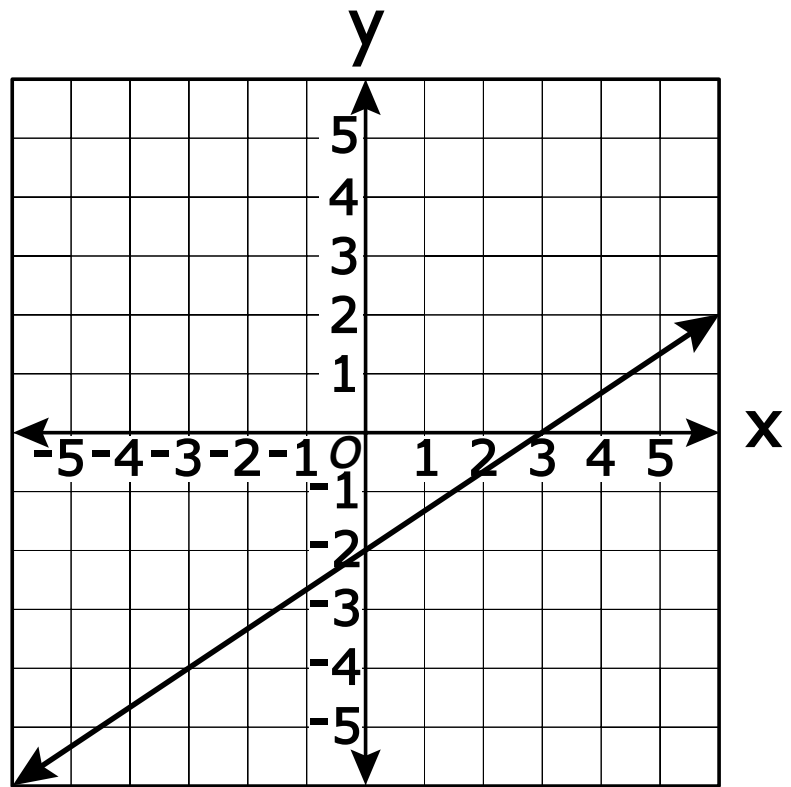
A



C

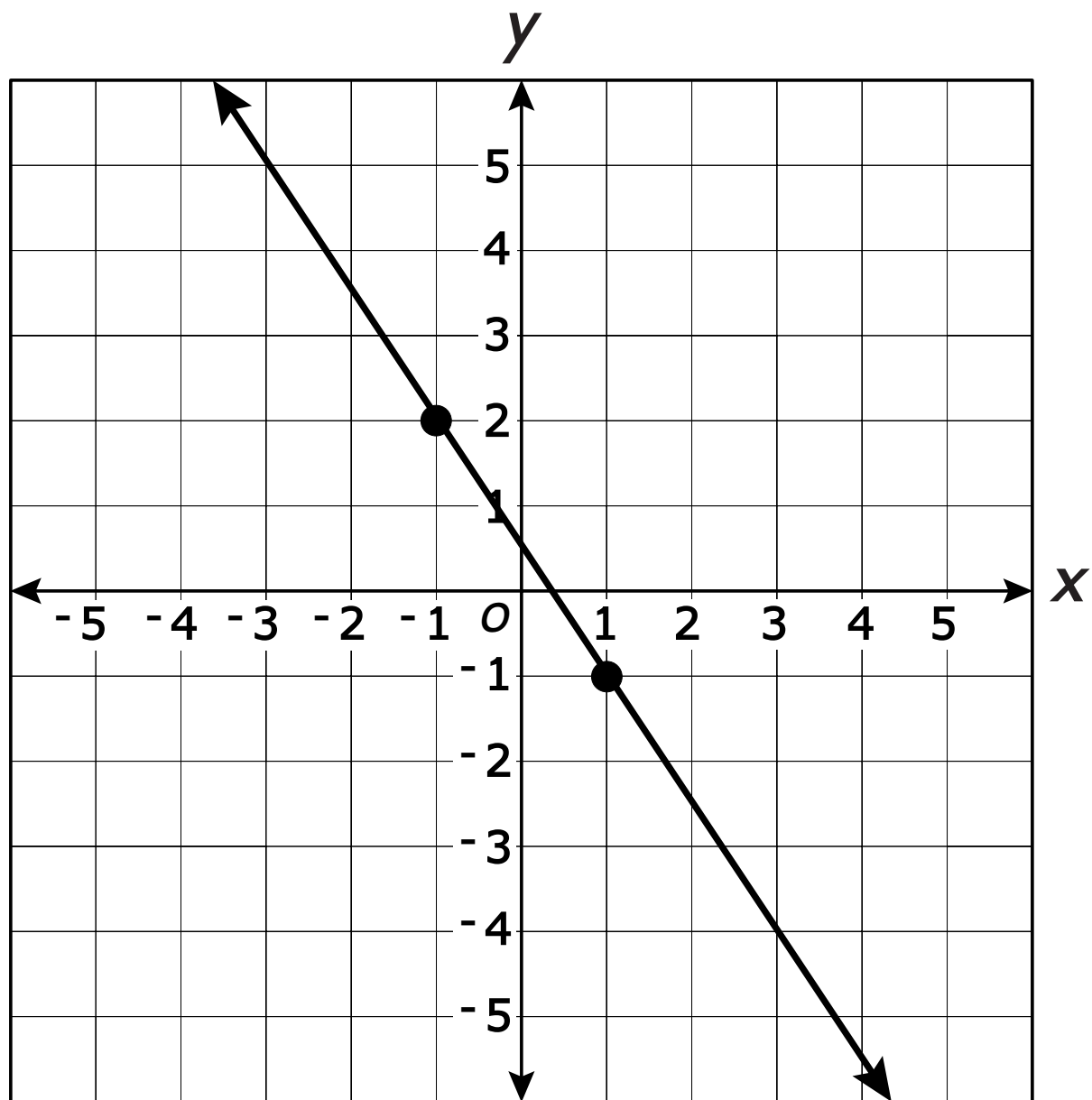


B



D

10



The line shown contains  $(-1, 2)$  and  $(1, -1)$ . What is the slope of the line?

F  $\frac{3}{2}$

G  $\frac{2}{3}$

H  $-\frac{2}{3}$

J  $-\frac{3}{2}$



11 What is the slope of the line

$$y = 2x - 3?$$

A -3

B  $-\frac{3}{2}$

C  $-\frac{2}{3}$

D 2

12 Which is an equation of the line with slope  $\frac{2}{3}$  that passes through the point (4, -1)?

F  $y = -\frac{1}{4}x + \frac{2}{3}$

G  $y = -4x + \frac{2}{3}$

H  $y = \frac{2}{3}x - \frac{5}{3}$

J  $y = \frac{2}{3}x - \frac{11}{3}$

13

$x$	-1	0	1	2
$y$	-3	-1	1	3

Which equation fits the data in the table?

A  $y = x - 2$

B  $y = 2x - 1$

C  $y = 3x - 3$

D  $y = x + 1$

14 Karen makes \$5 per hour baby-sitting and \$12 per hour giving music lessons. One weekend, she worked a total of 18 hours and made \$139. How many hours did she spend baby-sitting?

F 11

G 9

H 7

J 6

15 
$$\begin{cases} x - y = 5 \\ x + y = 7 \end{cases}$$

What is the solution to the system of equations shown above?

A  $x = 6, y = 1$

B  $x = 4, y = 3$

C  $x = 1, y = 6$

D  $x = -1, y = 7$

16 The Arcadia Theater charges \$4 for adult tickets and \$3 for student tickets. Mr. Steele purchased 9 tickets (some student and some adult) for \$31. Which system of equations could be used to find  $a$ , the number of adult tickets, and  $s$ , the number of student tickets Mr. Steele purchased?

F 
$$\begin{cases} a + s = 31 \\ 4a + 3s = 9 \end{cases}$$

G 
$$\begin{cases} 4a + 3s = 31 \\ a + s = 9 \end{cases}$$

H 
$$\begin{cases} 3a + 4s = 31 \\ a + s = 9 \end{cases}$$

J 
$$\begin{cases} 3a + 4s = 9 \\ a + s = 31 \end{cases}$$

17 What is the solution to the inequality shown below?

$$-2x + 3 > 7$$

A  $x < -5$

B  $x < -2$

C  $x > 2$

D  $x < 3$

18 Which of the following is a solution of the equation

$$x^2 - 13x + 40 = 0?$$

F  $-8$

G  $4$

H  $5$

J  $10$

19 The formula for the surface area of a cylinder is  $SA = 2\pi r(h + r)$ . What is the value of  $SA$  when  $r = 3$  centimeters and  $h = 4$  centimeters?

A  $28\pi \text{ cm}^2$

B  $32\pi \text{ cm}^2$

C  $36\pi \text{ cm}^2$

D  $42\pi \text{ cm}^2$

20 A consulting engineer bills his customers \$90 for each hour he works. If a client's bill is \$955, which equation could be used to find the number of hours worked?

F  $\frac{90}{x} = 955$

G  $\frac{x}{955} = 90$

H  $90x = 955$

J  $955x = 90$



21 Which is equivalent to

$$(-2ab^3)(-3a^2b^5)?$$

A  $-5ab$

B  $6a^2b^{15}$

C  $6a^3b^2$

D  $6a^3b^8$

22 Which expression is equivalent to

$$2x^3y(x^2y - 3xy^2)?$$

F  $2x^5y^2 - 6x^4y^3$

G  $3x^5y^2 - 5x^4y^3$

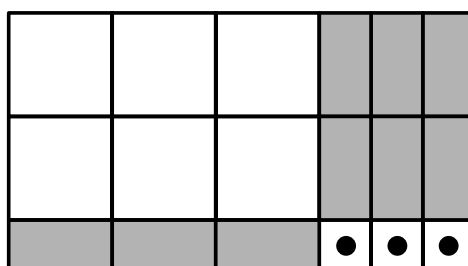
H  $2x^6y^2 - 6x^3y^2$

J  $2x^6y - 6x^3y^3$

23

$$\square = x^2 \quad \text{shaded square} = x \quad \text{square with dot} = 1$$

Consider the models above.



What polynomial is represented by this diagram?

- A  $6x^2 + 12x$
- B  $2x^2 + 3x + 1$
- C  $6x^2 + 9x + 3$
- D  $9x^2 + 6x + 3$

24 Which is one of the correct factors of

$$x^2 - 3x - 18?$$

F  $(x - 2)$

G  $(x + 6)$

H  $(x - 9)$

J  $(x + 3)$

25 If  $x \neq 0$ , which expression is equivalent to

$$\frac{8x^7 - 2x^3 + 2x}{2x}?$$

A  $6x^6 - x^2$

B  $4x^6 - x^2$

C  $6x^7 - x^3 + x$

D  $4x^6 - x^2 + 1$

26 If  $ab \neq 0$ , which is equivalent to

$$\frac{-12a^3b^2}{6ab^2}?$$

F  $2a^2b$

G  $-2a^2$

H  $-6a^2b$

J  $6a^4b^4$

27 When factored completely,

$$x^2 - 9 \text{ equals}$$

A  $(x + 3)(x - 3)$

B  $(x + 1)(x - 9)$

C  $(x - 3)^2$

D  $(x + 3)^2$

28 The speed of sound in water is  $1.46 \times 10^3$  meters per second. The speed of sound in air is  $3.31 \times 10^2$  meters per second. How much faster does sound travel in water than in air?

F  $1.85 \times 10^{-3}$  m/s

G  $1.129 \times 10^2$  m/s

H  $1.85 \times 10^2$  m/s

J  $1.129 \times 10^3$  m/s

29 Which is closest to the value of

$$(2\sqrt{3})(6\sqrt{2})?$$

- A 7.7
- B 8.5
- C 18.0
- D 29.4

30 Which measure is closest to the length of a side of a square that has an area of 221 square feet?

- F 11.0 ft
- G 14.9 ft
- H 16.4 ft
- J 55.2 ft

31 The ordered pairs shown form a quadratic pattern.

$x$	$y$
0	1
1	2
2	5
3	10
4	17
5	?

What is the missing value of  $y$ ?

- A 10
- B 22
- C 24
- D 26

$x$	$y$
-2	-11
2	1
4	7
0	-5

Which equation is true for all the values in the table?

F  $y = x - 9$

G  $y = x - 5$

H  $y = 3x - 5$

J  $y = 2x - 7$



33 What is the range of the function

$$f(x) = (x - 1)^2$$

when the domain is  $\{-5, 0, 5\}$ ?

- A  $\{1, 16, 36\}$
- B  $\{1, 24\}$
- C  $\{1, 26\}$
- D  $\{-12, -2, 8\}$

34 If  $f(x) = -2x^2 + x - 5$ , what is  $f(3)$ ?

F -20

G -14

H 16

J 34

35 Which is a zero of the function

$$f(x) = x^2 - 8x + 7?$$

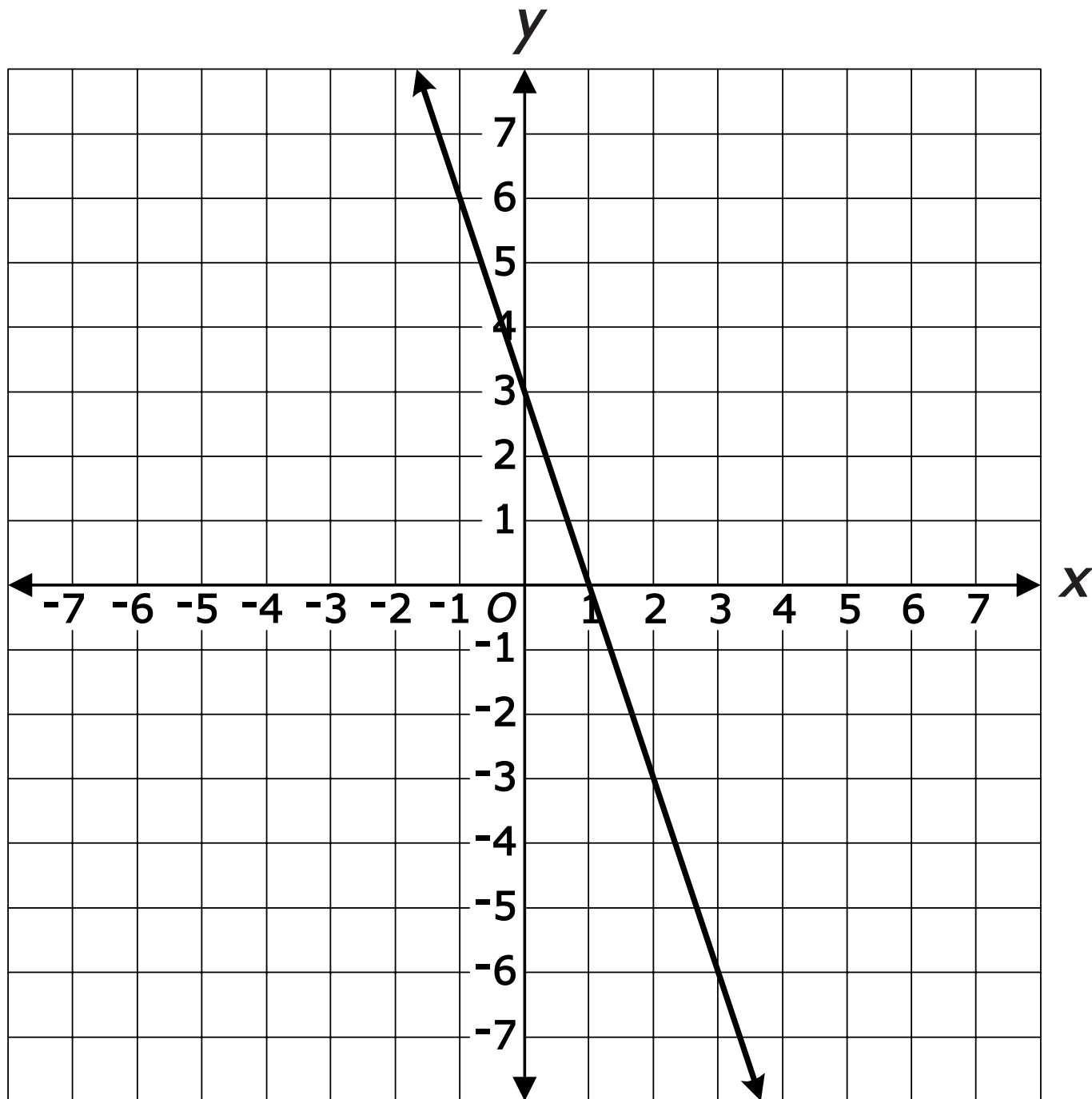
A 8

B 7

C -1

D -7

36 The graph of the function  $f(x) = -3x + 3$  is shown.



What is the value of  $f(3)$ ?

F 3

G 0

H -2

J -6

- 37 The table gives the average per capita income,  $d$ , in a region of the country as a function of the percent unemployed,  $u$ .

$u$	1	2	3	4
$d$	22,500	22,000	21,500	21,000

Which equation represents this data algebraically?

- A  $d = 20,000 + 1,000u$
- B  $d = 22,000 + 500u$
- C  $d = 23,000 - 500u$
- D  $d = 25,000 - 1,500u$

38 Which of these data sets represents a function?

$x$	$y$
3	7
6	5
6	10
12	9
18	10

F

$x$	$y$
1	-1
1	1
4	-2
4	2

H

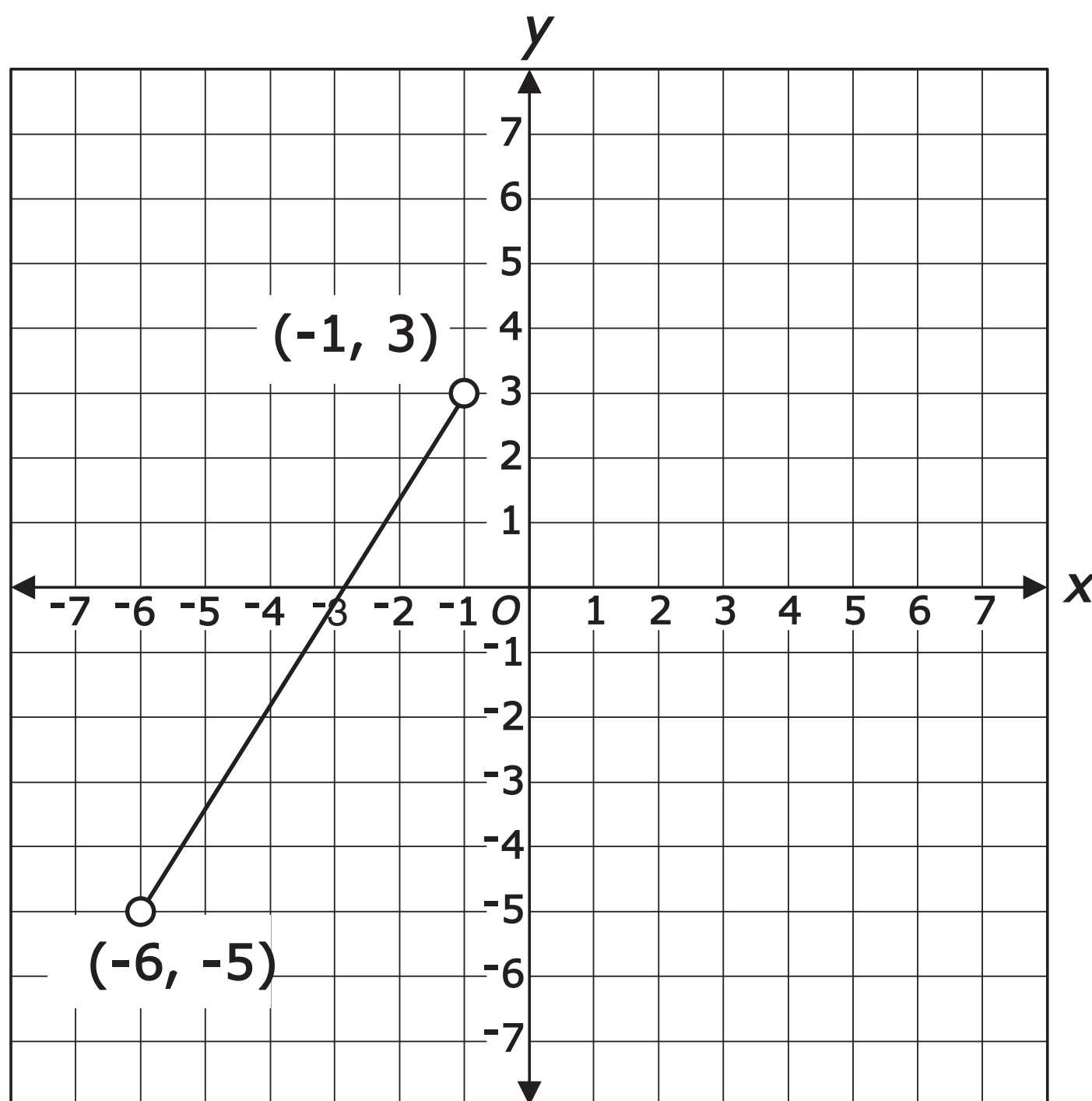
$x$	$y$
-5	25
-2	4
2	4
5	25

G

$x$	$y$
-5	10
-5	-10
5	10
5	-10
7	18
9	14

J

- 39 The number of words Maria typed varied directly with the amount of time she spent typing. If she typed 275 words in 5 minutes, how long would it take her to type 1,100 words?
- A 220 minutes
  - B 20 minutes
  - C 15 minutes
  - D 4 minutes



What is the range of the function of  $x$  graphed above?

- F {all real numbers  $< 3$ }
- G {all real numbers  $< -1$ }
- H {all real numbers between  $-6$  and  $-1$ }
- J {all real numbers between  $-5$  and  $3$ }

41 If  $y$  varies directly as  $x$  and the constant of variation is  $-2$ , which equation represents this relationship?

A  $y = -2x$

B  $y = \frac{-2}{x}$

C  $y = \frac{x}{-2}$

D  $y = 2x$



$x$	$y$
1	\$0.05
2	\$0.10
3	\$0.15
4	\$0.20
5	\$0.25

Which is an equation for the variation that includes all the data in the table?

F  $xy = 0.05$

G  $y = x + 0.05$

H  $y = 0.05x$

J  $y = \frac{x}{0.05}$

43 Sally recorded her daily grades for one grading period.

88, 88, 87, 92, 78, 88, 93, 100, 92, 90, 92, 92

What was her mean grade?

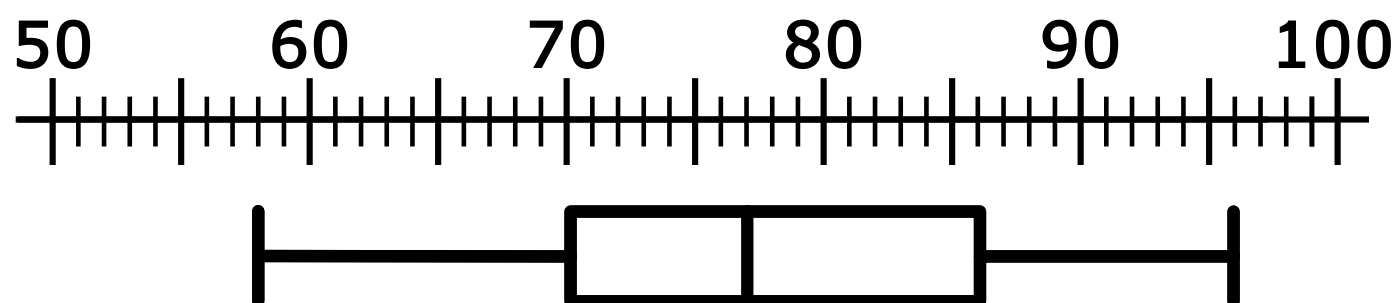
A 92

B 91

C 90

D 88

44 Mr. Andrews made a box-and-whisker graph of the quiz grades in his chemistry class.



Which is the median quiz grade for the class?

F 70

G 77

H 80

J 85

45 This matrix shows the prices for some items at three hamburger shops.

	Shop 1	Shop 2	Shop 3
Burger	\$2.60	\$1.60	\$2.10
Fries	\$0.80	\$0.60	\$0.70
Shake	\$1.00	\$0.90	\$1.10

Each of the three shops honor their competitors' coupons. Which matrix shows what the prices would be with a 10%-off coupon?

A  $\begin{bmatrix} \$2.34 & \$1.44 & \$1.90 \\ \$0.72 & \$0.54 & \$0.63 \\ \$0.90 & \$0.81 & \$1.00 \end{bmatrix}$

B  $\begin{bmatrix} \$2.36 & \$1.44 & \$1.89 \\ \$0.72 & \$0.54 & \$0.63 \\ \$0.90 & \$0.81 & \$1.00 \end{bmatrix}$

C  $\begin{bmatrix} \$2.36 & \$1.44 & \$1.90 \\ \$0.72 & \$0.54 & \$0.63 \\ \$0.90 & \$0.81 & \$0.99 \end{bmatrix}$

D  $\begin{bmatrix} \$2.34 & \$1.44 & \$1.89 \\ \$0.72 & \$0.54 & \$0.63 \\ \$0.90 & \$0.81 & \$0.99 \end{bmatrix}$

46  $-2\begin{bmatrix} -2 & 4 \\ -3 & -6 \end{bmatrix}$  is equal to which matrix?

F  $\begin{bmatrix} -4 & 2 \\ -5 & 12 \end{bmatrix}$

G  $\begin{bmatrix} -4 & 2 \\ -6 & 8 \end{bmatrix}$

H  $\begin{bmatrix} 4 & -8 \\ 6 & 12 \end{bmatrix}$

J  $\begin{bmatrix} 0 & 2 \\ 1 & 4 \end{bmatrix}$

47  $\begin{bmatrix} 2 & -4 \\ 3 & 2 \end{bmatrix} + \begin{bmatrix} 6 & 1 \\ 4 & 2 \end{bmatrix}$  is equal to which matrix?

A  $\begin{bmatrix} 8 & -3 \\ 7 & 4 \end{bmatrix}$

B  $\begin{bmatrix} 12 & -4 \\ 12 & 8 \end{bmatrix}$

C  $\begin{bmatrix} 8 & 4 \\ 0 & 4 \end{bmatrix}$

D  $\begin{bmatrix} -4 & -6 \\ 26 & 7 \end{bmatrix}$

48 The chart below shows the ages in years of the girls on two Olympic teams.

Gymnastics	14	17	15	15	16	13	12
Swimming	15	17	19	12	14	18	12

What is the difference in the median ages of the two teams?

- F 0 yrs
- G 1 yrs
- H 2 yrs
- J 3 yrs

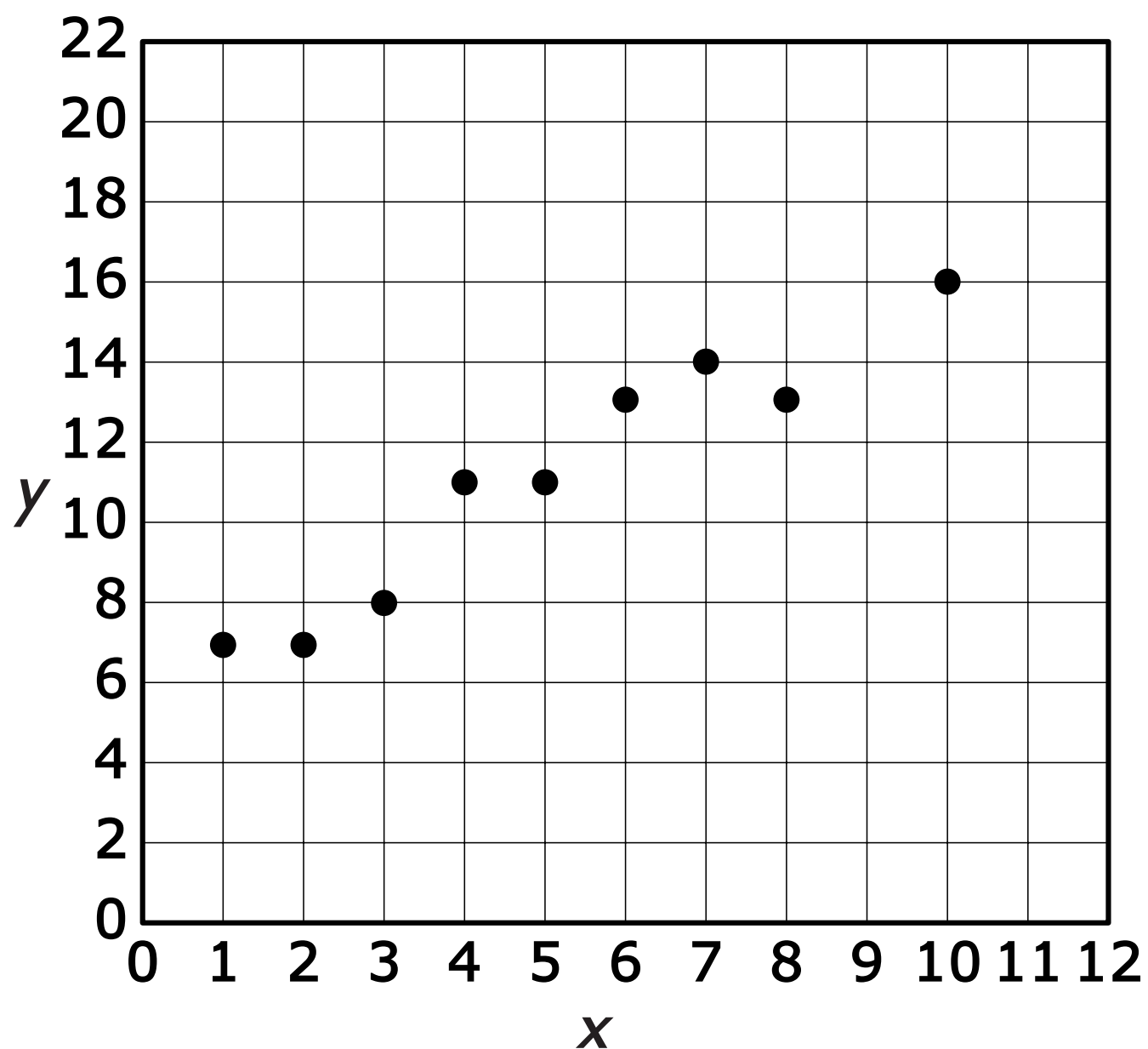


49 Joe's New Car dealership lists the following prices for this year's models.

\$10,469, \$12,895, \$15,499, \$17,999,  
\$18,595, \$21,245, \$10,395, \$14,985

What is the range in prices?

- A \$15,260
- B \$15,242
- C \$10,850
- D \$10,776



Using the data plotted on the scatterplot, which equation most closely describes a line of best fit for the data?

F  $y = x + 6$

G  $y = 2x - 4$

H  $y = 2x + 5$

J  $y = 3x - 4$

# Answer Key

Test Sequence	Correct Answer	Reporting Category	Reporting Category Description
1	C	003	Equations and Inequalities
2	G	003	Equations and Inequalities
3	B	003	Equations and Inequalities
4	G	003	Equations and Inequalities
5	C	003	Equations and Inequalities
6	G	003	Equations and Inequalities
7	D	003	Equations and Inequalities
8	F	003	Equations and Inequalities
9	A	003	Equations and Inequalities
10	J	003	Equations and Inequalities
11	D	003	Equations and Inequalities
12	J	003	Equations and Inequalities
13	B	003	Equations and Inequalities
14	F	003	Equations and Inequalities
15	A	003	Equations and Inequalities
16	G	003	Equations and Inequalities
17	B	003	Equations and Inequalities
18	H	003	Equations and Inequalities
19	D	001	Expressions and Operations
20	H	001	Expressions and Operations
21	D	001	Expressions and Operations
22	F	001	Expressions and Operations
23	C	001	Expressions and Operations
24	J	001	Expressions and Operations
25	D	001	Expressions and Operations
26	G	001	Expressions and Operations
27	A	001	Expressions and Operations
28	J	001	Expressions and Operations
29	D	001	Expressions and Operations
30	G	001	Expressions and Operations
31	D	002	Relations and Functions
32	H	002	Relations and Functions
33	A	002	Relations and Functions
34	F	002	Relations and Functions
35	B	002	Relations and Functions
36	J	002	Relations and Functions
37	C	002	Relations and Functions
38	G	002	Relations and Functions
39	B	002	Relations and Functions
40	J	002	Relations and Functions
41	A	002	Relations and Functions
42	H	002	Relations and Functions
43	C	004	Statistics
44	G	004	Statistics
45	D	004	Statistics
46	H	004	Statistics
47	A	004	Statistics
48	F	004	Statistics
49	C	004	Statistics
50	F	004	Statistics



1 2 3 4 5 6 7 8 9 10 11 12 A B C D E